**ST.MARY'S UNIVERSITY**

**SCHOOL OF GRADUATE STUDIES**

# THE CONTRIBUTION OF EXPORT EARNINGS TO ECONOMIC GROWTH OF ETHIOPIA: A TREND ANALYSIS


**BY**

**SENAIT GETAHUN**


**JUNE, 2014**

**ADDIS ABABA**

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**SENAIT GETAHUN**

**ADVISOR: DAGNEW ESHETE (PhD)**

A Thesis Submitted to the School of Graduate Studies of St.Mary's University in Partial Fulfillment of the Requirements for the Degree of Masters of Science in Agricultural Economics

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## EXAMINER APPROVAL SHEET

This is to certify that the thesis prepared by Senait Getahun in titled "The Contribution of Export Earnings to Economic Growth of Ethiopia: A trend Analysis" and submitted in partial fulfillment of the requirements for the degree of Masters of Science in Agricultural Economics complies with the regulation of St.Mary's University and meets the accepted standards with respect to originality and quality.

**Approved by Board of Examiners**

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| **Advisor** | **Signature** |
| **Examiner (External)** | **Signature** |
| **Examiner (Internal)** | **Signature** |

## Declaration

I declare that this MSc. thesis is my original work, has never been presented for a degree in this or any other university and that all sources of materials used for the thesis have been duly acknowledged.

Student Name: Senait Getahun

Signature: _____

Name of the Institution: St.Mary's University

Date of Submission: June, 2014

**ENDORSEMENT**

This thesis has been submitted to St. Mary's University School of Graduate Studies for examination with my approval as a university advisor.

Dr.Dagnew Eshete _____

Advisor Signature and Date

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## ACRONYMS

| | |
|---|---|
| ADF | Agumented Dicky-Fuller |
| AIC | Akaike Information Criterion |
| EEA | Ethiopian Economic Association |
| ELG | Export-Led Growth |
| ELGH | Export-Led Growth Hypothesis |
| EPRDF | Ethiopian Peoples Revolution Democratic Front |
| ECM | Error correction Model |
| GDP | Gross Domestic Product |
| GLE | Growth- Led Export |
| HIC | Hannan-Quinn Information Criteria |
| IS | Import –Substitution |
| IMF | International Monetary fund |
| LDCs | Least Developed Countries |
| LL | Log Likelihood Information Criterion |
| MEDaC | Ministry of Economic Development and Cooperation |
| MoFED | Ministry of Finance and Economic Development |
| NBE | National bank of Ethiopia |
| PP | Pihillps Perron |
| SAP | Structural Adjustment Program |
| SIC | Schwarz information criteria Information Criterion |
| SSA | Sub-Saharan Africa |
| TGE | Transitional Government of Ethiopia |
| VAR | Vector Autoregression |
| VECM | Vector Error correction Model |
| WB | World Bank |

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## ABSTRACT

Empirically examining the contribution of different macroeconomic variables to economic growth would help the country to formulate conducive policies to foster economic growth to this regard, this study investigated the contribution of export earnings on economic growth of Ethiopia for the period 1960/61-2011/12 by empirically testing the longrun and shortrun relationship and causality between exports and economic growth via including another macroeconomic variable i.e import using popular time series econometric techniques of cointegration ,vector error correction estimation and Granger causality test and to review the policies commenced by the different regimes in relation to export. The results from unit root test shows that all variables are order one integrated; and Johansen cointegration shows the existence of longrun relations among the variables. Furthermore, the Granger causality test conducted indicate that in the shortrun there is no causality among variables but in the long run there is bidirectional causality among the three variables including: GDP, Export and Import. The key finding in this study is that export growth positively and significantly affected economic growth and growth also stimulate export in the long run. This provided support for the adoption of both Export -Led Growth and Growth-Led Export growth strategies in case of Ethiopia. Thus effort should be directed towards policies that will expand the volume of a country's exports and at the same time promote the emergence and expansion of domestic industries.

# CHAPTER ONE

# INTRODUCTION

## 1.1 Background of the Study

Economic growth can be generally defined as an increase in per capita output or income over a period of time. The process of economic growth is a highly complex phenomenon which is influenced by numerous and varied factors, among other factors openness to international trade is considered as one of the very important contributors to growth (Samuelson and Nordhaus, 2010). Export, as one of the macroeconomic variable, is always remaining important for growth, enabling the countries to pay for imported capital goods and other essential resources that have multiplier effects on the overall economic wellbeing. According to the advocates of export-led growth hypothesis (ELGH), export leads to better resource allocation, create economies of scale and production efficiency through technological development, capital formation, employment creation, and hence economic growth. (Todaro and Smith, 2012)

International trade significantly contributed to the economic growth of developed nations like the United States, Canada, Australia, New Zealand that were once developing nations (Salvatore, 1990). It has also played a crucial role in the historical economic growth achievement of the four East Asian Tiger economies (South Korea, Hong Kong, Singapore, and Taiwan)( Medina-Smith E.J. 2001, Palley, 2011).Countries with higher international trade involvement achieve a higher and faster economic growth than those that has less involvement in international trade. This can be confirmed by comparing the remarkable success of the four East Asian Tiger economies in the 1970's to 1990's who followed export-led growth strategy and the poor growth achievement of many African and some Latin American countries who focuses on import substitution growth strategy in the same period.

Many developing countries have attempted to pursue the East Asian growth model in recent decades. This model is widely perceived to have been based on export-led growth. Ethiopia, like other developing countries, pursued the export-led growth strategy since 1992 after years of implementation of the import substitution (IS) strategy during the Imperial and Derg regimes. However, the IS trade strategy pursued during the previous regimes hadn't performed

well, because the import competing industries remained infant and were at their rudimentary stage despite the tariff and non-tariff protection (Gemechu, 2002).

Following the export-led growth strategy, Ethiopia's economy as well as its export composition still remained highly dependent on agriculture. Agriculture contributes about 41% and over 80% to national GDP and export sector respectively (NBE, 2010/11). The export earnings contribution from 1960 to 2010 accounted to 11% to GDP on average (Jarra, 2013) which is very low when compared with 30% contribution to GDP in Sub-Saharan African countries (Hailu, 2011). Such a low figure suggests that much has to be done in the Ethiopian export sector to achieve the desired economic growth level.

Hence, investigating the contribution of export earnings to economic growth in-depth in relation to the development policies followed by the country during the past two regimes and the current regime would be essential to design workable policies and strategies for sustainable economic growth achievement. Therefore this study examines the contribution of export earnings to economic growth of Ethiopia from 1960/61 to 2011/12 using time serious data.

### 1.2 Statement of the Problem

The wave of growth in the Four Tigers and the Newly Industrialized Countries has been used to support the argument that carefully managed openness to trade through an export-led growth strategy is a mechanism for achieving fast growth. The experiences of these countries have provided evidences that export-led growth (ELG) strategy can lead to growth (Todaro &Smith, 2006). Moreover, many developing countries tried to go after the experience of these countries.

Ethiopia like any other nation aims at achieving an appropriate economic growth; but, like most least developed countries (LDCs), the country is not self sufficient in generating the saving that is essential for realizing a sustainable economic growth by its own, in this case the external sector (trade) becomes one of the very important factor for the growth performance of the national economy (Gemechu, 2002). During the past five decades (1960/61 to 2011/12), the country is becoming more and more open increasing its external linkages with the rest of the world (trade openness goes from 6% in 1960/61 to 15% in 2004/05). Despite Ethiopia shift from inward looking (import substituting strategy) to export promotion strategy, the export

sector does not contribute to the economic growth of the country as expected due to structural problems and policy constraints (Wolde, 2007:5).

Many studies have been conducted on LDCs to check whether exports do contribute to economic growth or not. Although most of the empirical works support the export-led economic growth hypothesis, there is no overall consensus on this issue. Some economists (Krueger, 1978; Tyler, 1981; Kavoussi, 1984; Ram, 1987; Chow, 1987; and Salvatore and Hatcher, 1991) seem to generally agree that export has a positive and significant impact on countries economic growth; others (Medina-Smith E.J, 2001; Mishra, P. K., 2011; Abbas,S. 2012,) doubt the existence of such a relationship.

Therefore, the evidence regarding export-economic growth nexus is somewhat ambiguous and mixed globally in general. Furthermore, previous studies on this issue in the context of Ethiopia are only a few; and even the limited available ones provide mixed evidences. For instance the study conducted by Gemechu,(2002) support the contribution of real exports to economic growth in the context of Ethiopian economy in the short run where as Chemeda, (2001) says the contribution of real exports to economic growth in the context of Ethiopian economy is greater in the long run than in the short run. But both studies does not include the most important macroeconomic variable i.e., import while considering the causality between export and growth. Even though Wolde (2007) included import while considering the causality between growths and export his result fails to identify strong causal relation between export and economic growth. This varied results caught the attention of the researcher to do further study in the export and economic growth sector in the context of Ethiopia.

Thus, this paper aims to explore the trend of export earnings contribution to the economic growth of the country by considering the short run and long run effects of exports on economic growth of Ethiopia. The following are central questions addressed by this study:

- Is there any long run equilibrium relationship between export and economic growth?
- Does export growth influence economic growth?
- Does export growth leads to economic growth or is it vice versa?

## 1.3 Objective of the Study

The main objective of the study is to identify the contribution of export to economic growth of Ethiopia, focusing on five decades trend analysis (1960/61 – 2011/12).

The specific objectives of the study include:

- Analyzing and measuring the magnitude and contribution of decades of export performance;
- Investigating the causal link between export and economic growth; and
- Assessing the country's development policies and strategies in relation to export

## 1.4 Significance of the Study

Identifying the contribution of export to the different sectors of the economy facilitate the design of policies that would help the country fully exploit the benefits of the sector. The outcomes of this study may provide relevant information about the link of exports and economic growth and policies suggestions that may ensure economic growth, as it is expected to provide an empirical result concerning the contribution and casual relation of export to economic growth. Moreover the paper might used as reference for further research conducting on these topics and related issues in the academic world.

## 1.5 Scope and Limitation of the Study

The study examined the contribution of export earnings to economic growth, and the causal link of export and economic growth of the country (Ethiopia) from 1960/61 to 2011/12. It also looked at the country's development policies and strategies implemented in relation to export-led economic growth in the last five decades. However, it does not go forth to examine the complete alternative growth strategy of the country. The limitation of this study were unavailability of long year's data for most of the variables considered and the inconsistency of those data reported by different domestic institutions and this is overcomed by using data from international institution.

## 1.6 Structure of the Paper

This paper contains five chapters. The next chapter presents a review of pertinent literature, while chapter three discusses the methodology of the study. The fourth chapter presents the data analysis and discussion of the results. Chapter five presents the conclusions and policy implications based on the study findings.

# CHAPTER TWO
# REVIEW OF RELATED LITERATURE

## 2.1 Review of Export Back-up Efforts in Ethiopia

### 2.1.1 Imperial and Derg Regimes (Pre 1991/92 period)

Both the Imperial and Derg regime had been adopting inward oriented trade strategy, which used high level of protection, overvalued foreign exchange rate and control of import goods through high tariff imposition. These policies had unfavorable impact on the profitability and competitiveness of the export sector. Efforts however, had been made by both regimes to enhance and accelerate export and economic growth through designing three successive Five Year Development Plans during the Imperial period and a Ten Year Perspective Plan during the Derg regime.

The First Five-Year Plan (1957/58-1961/62) emphasized more on industrialization and construction of infrastructure that would facilitate the country's export growth. It also emphasized on export diversification through a full utilization of the agriculture potential and increased imports. The plan projected export to increase on average by 9% per annum. However, the actual average growth rate of export was 3.5% per year for the period (The First Five-Year Plan, 1962).

Structural transformations of the economy and export diversification were the major priority of the Second Five Year Development Plan (1962/63 to 1966/67). The plan intended to reduce the share of agricultural export commodities from 93% in 1961/62 to 72.3% in 1967/68; and increase the share of manufactured goods from 5% to 24% during the same period whose market prices are relatively stable and competitive; and exports were expected to increase on average by 11% per annum. The implementation of the plan was accompanied by incentives like income tax holidays, simplification of export licensing. Although the second five-year plan was projected for export to increase by 11% per annum, and reduction of agricultural export commodities from 93% to 72.3%, the registered actual growth rate was only 5% and 85% of export and agricultural product exports respectively.( Second Five Year Development Plan ,1968)

The Third Five-Year Development Plan (1968/69-1973/74) which was similar to the previous two development plans also acknowledged the importance of the export sector, especially the role of the nontraditional export items. Hence, export was projected to rise, on average to 10.7% annually. During this period, agricultural export products represented almost 75% of the total exports. Of this, coffee constituted about 55% of the total exports. The intention, however was to reduce the share of coffee to 40% by diversifying the export sector through encouraging exporters to engage in processing of hides and skins, canning fruits, vegetables and meat products, exporting minerals, textiles and chemicals. To achieve this goal, export diversification, fiscal and monetary policies were revised and other packages of incentives were also provided to exporters including simplification of licensing, provision of credit and subsidy, reduction of transport tariffs, etc. In addition to this, the route of Ethiopian Airlines and Shipping Lines were expected to provide market opportunity. The actual registered average growth rate of export was only 7.4 % (Third Five-Year Development Plan).

Similar to the experience observed during the Imperial government the military government (Derg) which came to power in 1974/75 had also been introducing different strategies and policies that would have a positive impact to improve Ethiopia's export performance. The overall policies of the Derg favored the expansion of collective and public enterprises. The government undertook a Ten-Year Perspective Plan (1985/86- 1994/95) aimed at orienting export structures of the country towards high value added products and increasing the amount and composition of manufactured exports, expanding the foreign exchange earnings, and increasing the socialization of the export sector with particular attention given to state owned export companies regardless of their inefficiency. Average annual export growth rate was targeted to stand at 15.4%. State owned export companies were expected to take up 90% of the export business and reduction of the share of all traditional exports to 53.2% from 73.5%,increasing the share of other export products (live animals, meat products, fruits and vegetables, spices, sugar and molasses, natural gum, chat and others) from 26.5% in1985/86 to 46.8% in 1994/95. The tools employed as incentives were provision of favorable tax, tariffs and foreign exchange rate measures, improving exports in terms of quality, quantity and variety and providing up to date information on world market prices and other factors in international market to exporters and producers. The other incentive scheme included the

introduction of the export subsidy scheme in 1983/84 and the directive issued to ban the export of raw hides and skins in 1989/90.

### 2.1.2 The EPDRF Regime (Post 1991/92 period)

The Ethiopian People Revolutionary Democratic Front (EPRDF) took the power from the Military regime, and established the Transitional Government of Ethiopia (TGE) in May 1991. The TGE in collaboration with the World Bank and IMF transferred the country's economic system from state controlled to market based economy and had introduced Structural Adjustment Program (SAP) and trade liberalization. (NBE, 1994/95) Such measures were adopted with the aim of stabilizing the country's economic condition with appropriate trade reform measures that was taken to ensure and promote the export sector through diversifying the narrow base of the nation's exports (MEDaC, 1999).

To implement the newly introduced adjustment and reform measures some of the policy packages and strategies include:

- Devaluation of successive Ethiopian currency i.e., from 2.07 Birr per USD to 5.00 per USD in 1992, then to 8.01 Birr per USD in 2005, to 10.77 Birr per USD in 2008 and finally to 13.62 Birr per USD in 2010. These measures were taken to promote export trade and exporters and to redirect trade movement from unofficial to official market channel.
- The tariff regime was continuously revised and reduced step-by-step. For instance, the maximum import duties lowered from 230 percent to 80 percent during the first move of important liberalization; and currently stood at 50 percent. Similarly, the state removed a 2 percent transaction tax on coffee export, and lifted the direct financial subsidy on export.
- A duty draw back scheme was introduced where by exporters are re-funded the tax and duty they paid on the inputs and raw materials used in export production. This is to provide exporters a free trade status on their import of intermediate inputs and encourage non-traditional export products, especially that of manufactured goods.
- The import and export licensing system were simplified and become more transparent so as to encourage new entrants in the export market
- A foreign exchange retention scheme has been introduced which entitles exporters to retain 10 percent of their earning to hold in their account and to sell the 40 percent at a

competitive rate, while submitting the remaining 50 percent directly to the National Bank. But the scheme may not be beneficial in view of the usual control over the use of the retained 10 percent and for the fact that it ties up the working capital.

- A preferential interest rate scheme is also introduced for exporters, which is less by 3.5 percent compared to the interest rate paid on non-export activity loans. Such low preferential interest rate scheme is provided for exporters because it is believed to strengthen the country's export diversification efforts.

## 2.2 Overview of Ethiopia's Economic and Export Growth Trend at a Glimpse

### 2.2.1 Overview of Ethiopia's Economic Growth Trend

"Ethiopia is one of the poorest and least developed countries in the world in terms of economic and social indicators. High incidence of poverty, low social service facilities, exponential population growth, unemployment, backward technology, low productivity, and environmental degradation, etc. have been the characteristic feature of Ethiopian economy"(Jarra,2013:28). The Ethiopian economy is highly dependent on agriculture, which accounts for 45% of GDP and around 80% of the population derives its livelihood directly or indirectly from agricultural production. The contribution made by agriculture, service sector and industry goes from 72%, 20% and 8% in 1960/61 to 43.7%, 44.9% and 11.5% in 2011/12. Although, the share of agriculture in GDP tended to decline over time, it still remains the largest employer; the main source of foreign exchange; and supplier of raw materials. Expansion of the services and agricultural sectors account for most of the recent growth achievements, while manufacturing sector's performance had been relatively modest (NBE, 2011/12).

Even though agriculture dominates the country's economy, strong and robust economic growth is becoming the current history of Ethiopia as the country has been experiencing broad based growth over the past years for instance, the average economic growth of the country from 2004/05-2011/12 was 10.6% which is higher compared to the African regional average of 4.9% (World Bank, 2013). Figure 2.1 shows Ethiopia's trends of growth rate of real GDP.

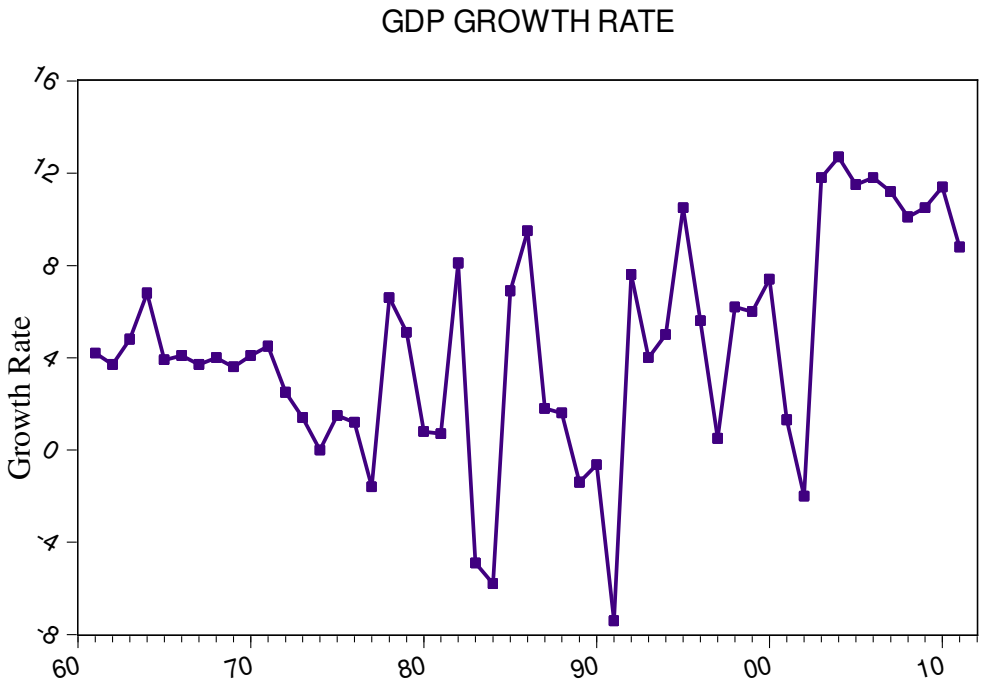


Fig 2.1: Growth rate of RGDP (1960/61-2011/12)
Source: Own sketch using EEA data base (2011/12)

As can be seen from the above graph (Fig.2.1), in general the country achieved a higher economic growth during the current government. The highest economic growth was achieved in 2003/04 although all sectors contributed to this relatively higher economic growth performance, agriculture becomes the leading sector contributing to about 62.4 percent to the 11.9 percent overall GDP growth, industry and service sectors also contributed by 12 and 26 percent, respectively. On the other hand, the lowest economic growth rate was registered in 1991/92 during the downfall of the Derg regime, which could be due to the long war that took place during the period. Generally, overall economic growth in Ethiopia has been highly associated with the performance of the agricultural sector. However, the dependence of the agricultural sector on the unpredictable rainfall and the influence of other exogenous factors

such as drought have made its performance erratic, leading to irregular overall GDP growth (Fig. 2.1).

### 2.2.2 Structure of Ethiopia's Major Exports (% of total)

The structure of the export sector of Ethiopia is dominated by a few primary products that account for a lion's share of the country's export earnings, while the share of non-agricultural products in total merchandise exports is almost insignificant. For the past five decades, primary agricultural products accounted to about 80-90% of the merchandise export earnings of Ethiopia. Among the major export products, as shown in Table 3.2 below, coffee accounts the major share of primary exports. From 1963/64-2011/12, Coffee, Oilseeds, Hides and Skin, Pulses, Chat, Fruit and Vegetables and Meat and Meat products accounted for 52.2, 7.8, 5.1, 3.4, 1.0 and 0.94 percent of the total export proceeds respectively. The average percentage share of coffee in the total merchandise exports during the Imperial, Derge and the present government was 54.7, 56 and 45 percent respectively. The smallest share of coffee in the total export was 24.5 percent in 1974/75, which was due to the problem of change in the government and political instability and the largest share was 79.3 percent in 1978/79 due to the then government's development campaign efforts. All these figures illustrate the fact that the Ethiopian merchandise export sub-sector is largely dependent on a single export commodity ( i.e coffee) for its badly needed foreign exchange earnings.

**Table 2.1: Average share of major exports (% of total)**

| Period | Coffee | Hides and Skin | Oilseeds | Pulses | Chat | Fruit | Meat and Meat Products |
|---|---|---|---|---|---|---|---|
| 1963/64-1973/74 | 54.7 | 10.3 | 9.7 | 8.03 | 0.23 | 0.52 | 0.93 |
| 1974/75-1990/91 | 56 | 10.8 | 3.9 | 4.35 | 1.02 | 0.99 | 0.68 |
| 1991/92-2010/11 | 45 | 9.3 | 9.6 | 3.9 | 7.9 | 1.2 | 1.1 |
| 1963/64-2011/12 | 52.2 | 10.3 | 7.8 | 5.1 | 3.4 | 1 | 0.94 |

Source: Own computation from NBE data

### 2.2.3. Growth Rate of Export

The total value of receipt from export grew at annual average growth rate of about 13% between 1963/64-2011/12. In terms of growth rate, on average that of chat was dominant

during the period. The least growth rate was registered by hides and skins. Moreover, Table 2.2 below shows the total average growth of major export items.

**Table 2.2: Average annual growth rate of total export earnings from major exports**

| Period | Coffee | Hides and Skin | Oilseeds | Pulses | Chat | Fruit and Vegetables | Meat and Meat Products |
|---|---|---|---|---|---|---|---|
| 1963/64-1973/74 | 2.7 | 5.1 | 1.2 | 13.8 | 0.8 | 27.9 | 14.5 |
| 1974/75-1990/91 | 7.1 | 22.7 | 0.08 | -0.1 | 69.8 | 19.5 | 12.78 |
| 1991/92-2010/11 | 25.08 | -2.6 | 104.2 | 42.5 | 221.00 | 8.7 | 86.97 |
| 1963/64-2011/12 | 11.62 | 7.96 | 45.4 | 21.4 | 97.20 | 4.5 | 51.8 |

Source: Gemechu (2002) and Own computation from NBE data

During the Imperial regime, earnings from the export of coffee, probably the largest exportable item had been growing at an average annual rate of 2.7 percent. Hides and Skin and Pulses which are the second largest exportable items grew at annual average growth rate of 5.1 and 13.1 percent respectively. Whereas oilseeds have a smaller growth rate during the period Chat, Fruit and Vegetables and Meat and Meat products had taken the remaining share.

During the Derg era (1974/75 – 1990/91), the average annual growth rate of real export showed a deteriorating trend, compared to the period of Imperial regime. It was due to the low attention given in the export sector in general and the poor performance from pulses and oilseeds in particular during the period. The proceeds from the export of the pulses and oilseeds, which was growing at an average annual rate of 13.8 and 1.2 percent during the Imperial regime, declined to 0.08 and -0.1 percent during the military regime.

After the takeover of the government by the EPRDF (i.e. since 1991) the growth rate in the real value of total exports had shown a significant improvement. This is due to different policy measures taken by the current government to promote exports. Revenue from the various export commodities has shown a considerable improvement. However, due to volatility and unpredictability of international market experience, growth rate of export during

2004/05-2010/11 had declined. The increase in the value of export contributed a lot for the registered economic growth during the period 1991/92-2005/06.

In general the trend analysis results (see Table 2.2 above and Fig.2.2 below) show that growth rates of exports in Ethiopia had been very volatile. This is basically attributed to factors related to demand side (a low income elasticity of commodities that Ethiopia exports, declining prices for its exports, and limited destinations for Ethiopian exports) and supply side (its dependency on few primary products and a very high degree of concentration of exports on few commodities) (Geda, 1999)

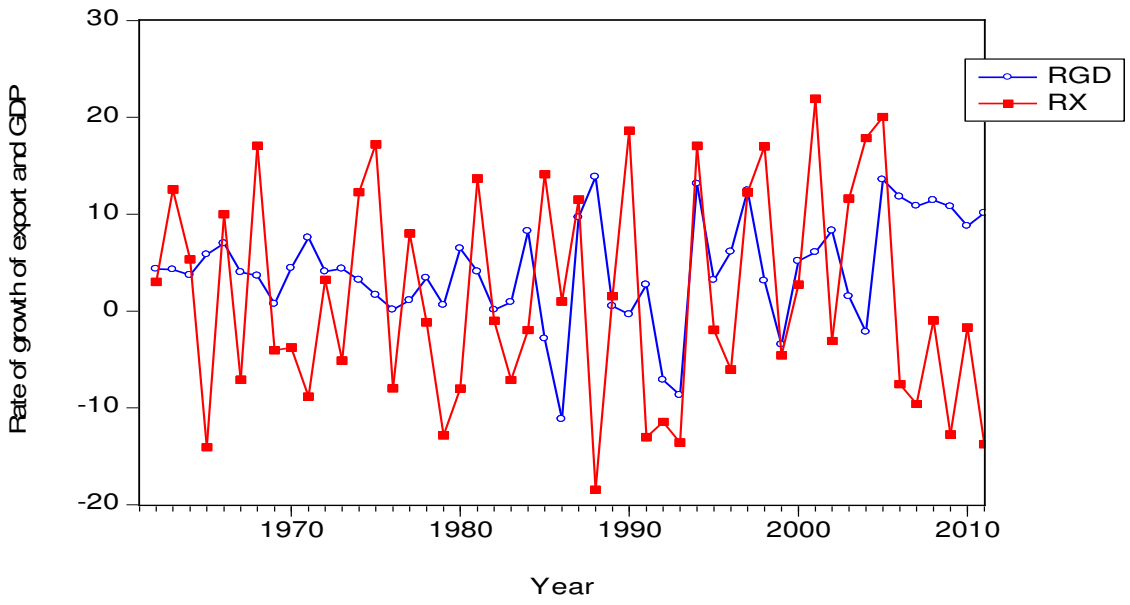


Figure 2.2: Growth rate of exports and GDP

Source: Own sketch using EEA data (2010/11)

### 2.2.4 The Contribution of Export to Different Sector of the Economy

Even though the composition of export sector of the country is dominated by agricultural products, it still plays a significant role in the growth performance of the Ethiopian economy. Export contributed about 11.0 percent to GDP during the past five decades (1960/61-2011/12).

The share of exports in GDP was the highest during the present government. The highest share was recorded in the year 1996/1997 which was about 16.2 percent of the GDP, the lowest being 4.5 percent during the transitional period (1991/92) after the fall of the Derg regime.

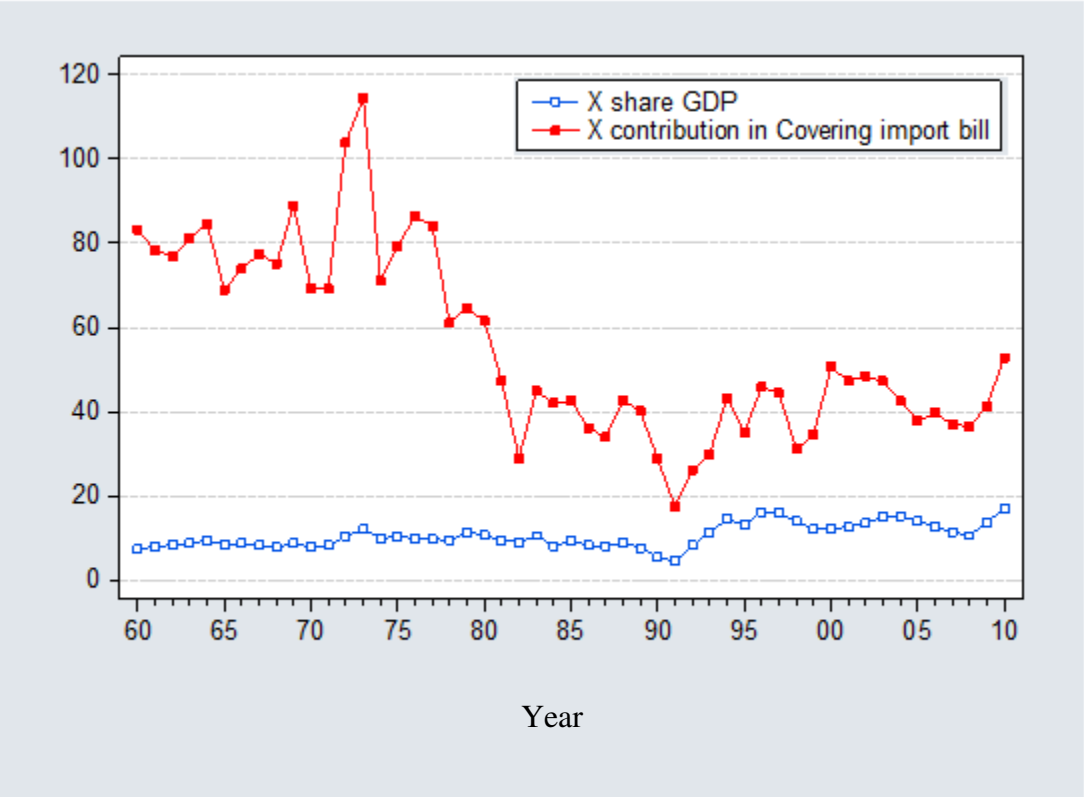


Figure.2.3 Share of export in GDP and in covering import bills

Source: Own sketch using EEA data (2010/11)

The revenue from exports made the import of inputs possible that are crucial for development purposes thereby playing as an engine of growth to other sectors. During the period 1960/61-2011/12 proceeds from exports covered more than 70.4 percent of the import bill of the country. In some years during the Imperial period, the proceeds from export were able to cover the total imports bill and even register a surplus (see Fig. 2.3 above). Hence analysis of the reviewed literature shows that, expanding exports enables the country to reduce the serious foreign exchange constraint faced that acts as a bottleneck for the growth of the economy.

In sum, assessed available literature reveals that both the two previous regimes and the current government had tried to maximize the contribution of export sector to the development of different sectors of the economy by designing different policies and strategies the efforts which are discussed in the section below.

### 2.3 Theoretical Literature

The argument concerning the role of international trade as one of the main deterministic factors of economic growth is not new. It goes back to the 17$^{th}$ century economic philosophy known as mercantilism. Mercantilism is an economic attitude that measures a country's economic growth by its accumulation of precious metal through exporting more than it imports the resulting export surplus to be used to purchase the valuable metals like gold and silver. (Mishra, 2011)

Adam smith attacked the main mercantilists' views and proposed the classical theory of international trade based on the concept of absolute advantage model. According to him stock of human, man-made and natural resources rather than stock of precious metals were the true measure of the wealth of a nation and argued that the wealth of a nation can be expanded if the government would abandon mercantilist controls. He also argued that trade can make a nation better off without making another worse off. Absolute advantage, however, explains only a very small part of the world trade today. Most of the world trade, especially trade among developed countries could not be explained by absolute advantage (Salvatore, 1990).

The model of comparative advantage was later articulated by David Ricardo to replace the principle of absolute advantage. According to this model, a country will specialize in the production and export of the commodity in which it has a comparative advantage. The comparative advantage model is based on a set of assumptions one of which being the labor theory of value. According to the labor theory of value, (a) either labor is the only factor of production or is used in the same fixed proportion or, (b) labor is homogeneous (i.e., only one type). Since neither of these assumptions is true, the labor theory of value must be rejected. In addition to the above argument, the comparative advantage model states that trade depends on the terms of trade which in turn is determined by internal cost ratios in two trading countries (i.e., by supply conditions alone). This obviously is flawed since terms of trade are not only determined by supply factors, but also by demand forces. In order to modify the Ricardian

theory, the principle of reciprocal demand was formulated by J.S. Mill, and later was developed by Edgeworth and Marshall. According to the reciprocal demand theory, it is both the demand and supply conditions which determine the terms of trade; and hence, trade between countries. However, the theory says nothing about the gains to be obtained through trade; it merely fills some gaps which existed in the early classical theory (Todaro and Smith, 2012).

As an attempt to modify the classical theory of trade, the factor endowment theory of Eli Hecksher and Berti Ohlin of external trade evolved. According to this theory, different products require productive factors in different relative proportions; and countries have different endowments of factors of production. Some countries have large amounts of capital (capital abundant); while others have little capital and much labor (labor abundant). This theory argues that each country has a comparative advantage in that commodity which uses the country's abundant factor. Thus capital abundant countries should specialize in the production and export of capital-intensive goods, while labor abundant countries should specialize in the production and export of labor-intensive commodities. This theory, which played a predominant role in the early literature of trade theory, encouraged third world countries to focus on their labor and land intensive primary product exports. It was argued that by exchanging these primary products for manufactured goods of the developed countries, third world nations could realize enormous benefits obtained from trade with the richer nations.

Although the factor endowment theory contributed a lot to the modern theory of international trade, the validity of the theory is based on a set of assumptions that are unlikely to hold. Specifically, six basic assumptions of the neo-classical trade model are criticized in explaining trade between the developed and the developing countries. In recent years economists have, therefore, challenged the static neo-classical model; and developed new models that explain trade between developed and developing countries. Unlike the traditional model which is assumed to be applicable to all nations, the so called North-South trade models focus, specifically on trade relation between rich and poor countries ( Ocampo, 1980).

Other theories of trade have also been put forward which attempt to either supplement the neo-classical trade theory or replace it with different approaches. These include the vent for surplus

theory of international trade (Myint, 1958), preference similarity or overlapping demand theory developed by Linder (1961), the technological gap and the product cycle theory articulated by Posner (1961) and Vernon (1966), respectively . These theories that are referred as complementary (alternative) theories do not suggest that the neo-classical trade model should be discarded. They are not comprehensive and try to fill a portion of the gap in the international trade that the traditional classical theory couldn't explain.

**Import Substitution and Export Promotion as Development Strategies**

## 2.4 Empirical Literature

Empirical studies conducted by different economists about the relationship between exports and economic growth can be grouped into two categories. The first type of empirical investigation focuses on cross-section analysis; and the second points to country-specific time serious studies.

### 2.4.1 Cross-sectional studies

Ibrahim (2002) estimated the productivity and externality effect of exports on GDP in six Asian countries (Hong Kong, Korea, Malaysia, Philippines, Singapore and Thailand) using Feder's model. His study result shows that the effect of exports on growth and productivity is positively significant; and the export sector have a positive effect on non-export sector. However, the extent of externality effect will depend on several factors, such as: size, policy orientation of exports, concentration of export products and processing level of exports.

Razmi and Hernandez (2011) studied whether Asian countries can sustain an Export-Led Growth Strategy in the aftermath of the global crisis. They use panel data for 44 Asian developing and 20 developed countries to address the question by distinguishing between different kinds of export and tradable led growth in order to more precisely identify the nature of growth in the pre-crisis decades. They found in particular that, the proportion of a country's manufactured exports (i.e., destined for industrialized countries) is most robustly associated with output growth; and the ELG has positive implications for growth of Asian developing countries in post-crisis period.

Oskooee etal (2005) studied the role of export to economic growth for 62 developing countries from 1960 to 1999 using panel unit root testing and cointegration. They found a long run

equilibrium equation when export is used as a dependent variable; and concluded that output growth would lead to export growth.

### 2.4.2 Time serious studies

Silaghi (2009) examined the export-led growth hypothesis (ELG) and growth-led export hypothesis (GLE) for the Central and Eastern European Countries from 1990-2004 for the Czech Republic, Estonia, Hungary, Latvia, Lithuania, Poland, Slovenia, Slovakia; and from 1990-2006 for Romania and Bulgaria, through cointegration and causality tests. The estimation is carried out within finite-order vector autoregressive (VAR) models in levels, in first-differences and error correction models. In bivariate systems she found bidirectional causality for Bulgaria, the Czech Republic, Estonia and Lithuania and unidirectional casuality from export to GDP for Latvia and from GDP to export for Hungary, Romania and Slovenia. The researcher also investigated if the above results still hold when including the other relevant component of the foreign trade (i.e., imports). In trivariate systems, ELG remains valid in the Czech Republic only and becomes valid in Lithuania while GLE is validated in Hungary, Romania and Slovenia.

Shirazi and Abudul Manap (2005) examined the ELG hypothesis for five south Asian countries (India, Pakistan, Nepal, Bangladeshi and Sri Lanka) through cointegration and multivariate Granger causality test. They found a longrun relationship between export, import and GDP for all countries except for Sri Lanka; and bidirectional causality between export and GDP to Bangladeshi and Nepal; unidirectional causality from export to GDP for Pakistan; and no causality for Sri Lanka and India.

Dorado (1993) used the ordinary least squares to examine the relation between export and economic growth of 87 countries including Ethiopia. He regress the variables on individual country time series basis rather than on cross-section analysis or pooled-times in order to avoid the vast heterogeneity between LDCs. His study result depicts very weak support for the argument that export growth promotes GDP growth, especially for poorer countries; and also a weak support for the alternate contention that GDP growth promotes export growth although somewhat stronger than the former.

Medina-Smith E.J. (2001) used the Cobb-Douglas production function model to examine the ELG hypothesis for Costa Rica, using annual data for the period 1950 to1997.Even if the results of the study suggest that exports have a positive effect on the overall rate of economic growth, and be considered an "engine of growth" as the ELGH advocates, investment and population were more significant in determining Costa Rica's overall economic performance. This is because the impact of export to economic growth was relatively small and limited, in both the short and the longrun. Based on his study result he concluded that, the ELGH is probably beneficial only for a limited number of developing countries, and only to a certain extent.

Abbas (2012) investigated the causal relationship between GDP and exports for Pakistan from 1975 to 2010. He used Johansen test of Cointegration and Granger Causality to determine the shortrun and longrun causality. His analysis result shows the existence of Cointegration and in the shortrun and longrun causality run from GDP to exports. Based on his study result he concluded that both in the short and longrun only growth in production cause exports growth.

Mishra (2011) reinvestigated the relationship between exports and economic growth using cointegration and vector error correction for India over the period 1970 to 2009. His study result shows the existence of longrun equilibrium relation between export and economic growth, and the rejection of export led growth hypothesis for India by the Granger causality test based on vector error correction model estimation.

Saad (2012) investigated the relationship between economic growth, exports and external debt of Lebanon over the period 1970-2010 with the inclusion of a fourth macroeconomic variable that is the exchange rate, using the vector error correction models (VECM) and Granger causality technique in order to investigate the presence of causality among the variables. The results show that both the shortrun and longrun relationships exist among these variables. Moreover, his findings suggest, bidirectional Granger causality between GDP and external debt servicing, unidirectional Granger causality from external debt to exports, unidirectional causality from exports to economic growth, and unidirectional causality running from exchange rate to economic growth.

Lopete (2004) examined the validity of the ELG hypothesis in nine Southern African countries (Botswana, Malawi, Mozambique, Namibia, Lesotho, South Africa, Swaziland, Zambia, and Zimbabwe) using cointegration and Granger-causality with two types of bivariate vector autoregressive models: models without exogenous variables VAR (p), and models with exogenous variables VARX (p, b) for the period 1980-2002. The results of the co-integration tests on both types of bivariate models show that all three Granger-causality alternative models fit the ELG study for Southern Africa (stationary models; integrated but not co-integrated models; and Error Correction Models). Without exogenous variables, the ELG hypothesis is found to be valid in Lesotho and Swaziland, and, with exogenous variables, it is valid in Botswana, Lesotho, and Swaziland, implying that expanding exports can contribute to economic growth.

Musonda (2007) did examine the validity of Export-Led Growth hypothesis for Zambia from 1970 to 2003. He used Johansen and Juselius (1990) multivariate cointegration framework and error correction approach to determine the short and long-run dynamics and causality between exports and economic growth. The result shows a bidirectional relationship flowing from economic growth to exports and vice versa in Zambia even though economic growth had strong influence on growth of exports, than vice versa.

Ajmi et.al (2013) investigated the dynamic causal link between exports and economic growth of South Africa using both linear and nonlinear Granger causality tests from 1911-2011. Their result on linear Granger causality result shows no evidence of significant causality between exports and GDP. The Hiemstra and Jones's (1994) nonlinear Granger causality test shows unidirectional causality from GDP to exports. However the Diks and Panchenko's (2005) test finds evidence of significant bi-directional causality.

Alimi and Muse (2013) examined the role of export in the economic growth process of Nigeria from 1970 to 2009 by employing unit root testing, co-integration analysis and VAR Granger causality/Exogeneity Wald Tests. They used three measures of export, namely: Total export, Oil export and Non-Oil export to enhance the stability and robustness of results. Accordingly total exports, oil exports and growth are cointegrated; but the cointegration test fails to support Non-Oil export and growth cointegration. Granger causality confirms uni-directional causality between export and economic growth in Nigeria in three measures of exports; and the direction

of causality runs strictly from economic growth to exports. Their study result provides support for growth-led export rather than export led growth in case of Nigeria.

Abou-Stait (2005) examined the export-led growth (ELG) for Egypt, using cointegration analysis, Granger causality tests, and unit root tests, coupled with vector auto regression (VAR) and impulse response function (IRF) analyses from 1977 to 2003. The study result shows the existence of long run relationship between GDP, exports and imports; and a unidirectional causality that goes from export to growth.

In case of Ethiopia, Chemeda (2001) used unit root tests, cointegration analysis and vector error correction methods to determine the relationship between export and economic growth in Ethiopia from 1950 to 1986. His study result depicts the presence of strong positive relationship between real export and real gross domestic product in the long run rather than in short run. Consequently, he concluded the contribution of real exports to economic growth in context of Ethiopian economy is greater in the long run than in short run.

Gemechu (2002) investigated the effect of exports on economic growth in Ethiopia for the period 1960/61-2000/01. He used cointegration and error correction approaches in the regression analysis and simultaneous equation model and the Granger causality test to examine the role of export to economic growth of the country. Accordingly, Gemechu found that export significantly affected economic growth in the short run. In addition to its direct effect, export is also found to indirectly affect economic growth and the causality runs from exports to economic growth.

Wolde (2007) investigated the relationship between export and economic growth by using cointegration, Vector error correction and Ganger causality test from 1960-2003. He found a longrun equilibrium relationship between export and economic growth, and significant positive contribution of export to growth, especially in the shortrun and weak support for the argument of export ganger cause economic growth in case of Ethiopia.

Allaro (2012) investigated empirically the ELG hypothesis on Ethiopia's economy using Granger causality test for the period 1974 to 2009 without testing their cointegeration which is a precondition for testing causality. The result confirms validity of export lead growth hypothesis for the economy of Ethiopia.

Jarra (2013) examined the causal relationship between exports, domestic demand and economic growth in Ethiopia using Granger causality and Johansen cointegration tests over the period 1960/61 to 2010/11. The result of Johansen's cointegration test indicates the existence of a long run relationship among the variables; and Granger causality test result shows a bi-directional relationship between export and economic growth, and between domestic demand and economic growth. Exports and domestic demands are important for economic growth; and economic growth has an impact on exports and domestic demand in Ethiopia.

# CHAPTER THREE

# METHODOLOGY OF THE STUDY

## 3.1 Model Specification

In the study of the export-growth linkage, a number of variables that might be important in the analysis can be considered. However, the limited number of available observations often necessities the use of simple models that capture the basics of the relationships of interest. The assessment of the effect of export performance on economic growth is carried out in a production function framework in which export and import enter as an additional 'input' in the production process. Following the works of different authors (Bahamin Oskooee, 2005, Abou-Stait, 2005, Kavouss, 1984), the model to be used can be derived from a general production function of the type:

$$Y_t=f(K_t\ L_t\ X_t\ M_t) \quad \text{---------- (3.1)}$$

Where, $Y_t$ is aggregate real output, $L_t$ and $K_t$ are the conventional labor and capital inputs, and $X_t$ and $M_t$ denote real exports and real imports, which is introduced as an additional input.

Since data on capital is not available Gross Capital Formation is used as a proxy for capita[1].

In an econometric form, equation (3.1) can be stated as:

$$\underset{+}{} \quad \underset{+}{} \quad \underset{+}{} \quad \underset{-}{}$$

$$LnY_t= \beta_o + \beta_1 LnGCF_t + \beta_2 LnLAB_t + \beta_3 LnX_t + \beta_4 LnM_t + \varepsilon_t \quad \text{---------- (3.2)}$$

Where, $Y_t$ is real GDP

$GCF_t$ is gross capital formation (%GDP)

$LAB_t$ is labor force

$X_t$ is export (%GDP)

$M_t$ is import (%GDP)

In equation (3.2), the signs above the variables suggest the anticipated relationship between each explanatory variable with the dependent variable.

## 3.2 Data Sources and Type

This study used annual data of Ethiopia and the samples are over the period from 1960/61 to 2011/12. The variables included in the analysis are economic growth proxied by Gross Domestic Product (GDP), capital proxied by Gross Capital Formation (GCF), labor force, export of goods

and services (X) and import of goods and services (M). The study uses the data collected by national and international organization for the purpose of examining the contribution of export to economic growth of Ethiopia and hence data were sourced from Ethiopian Ministry of Finance and Economic Development (MoFED), National Bank of Ethiopia (NBE), Ethiopian Economic Association (EEA) data base (2012) and Penn World Table version 8.0 (2011).

### 3.3 Method of Data Analysis and Estimation Technique

#### 3.3.1 Stationary and Non-Stationary Series

A time serious variable is said to be covariance (weakly) stationary if it has constant mean, finite time invariant variance and a covariance between any two-time period that depends only on the lag between them (Gujarati, 2004). Where as a non-stationary series has a different mean at different points in time; and its variance increases with the sample size. So, the primary task in an econometric work is to check whether a series is stationary or not. Because using the classical estimation methods to estimate relationships with non-stationary variables results in spurious regression. (Wooldridge, 2004 Gujarati, 2004)

#### 3.3.2 Tests for Unit Roots

There are several ways of testing for the presence of unit root (i.e., testing where the serious is stationary or not). This study uses the Augmented Dickey- Fuller (ADF) and the Phillips Perron (PP) to test for the stationarity of time series data. The ADF requires the estimation of the regression below which is carried out in the context of a model with constant (equation 3.3) and a constant and time trend (equation 3.4):

$$\Delta Y_t = \beta_1 + \beta_2 Y_{t-1} + \sum_{i=1}^{n} (\alpha_i \Delta Y_{t-1}) + \varepsilon_t \quad \text{.....(3.3)}$$

$$\Delta Y_t = \beta_1 + \beta_2 t + \beta_3 Y_{t-1} + \sum_{i=1}^{n} (\alpha_i \Delta Y_{t-1}) + \varepsilon_t \quad \text{.....(3.4)}$$

Where; $Y_t$ time series, $\Delta Y_{t-1}$ expresses the first differences with n lags determined by (SBC) lag selection criterion is the time trend and $\varepsilon_t$ is the variable that adjusts the error of autocorrelation. The coefficients $\beta_1$, $\beta_2$ $\beta_3$ and $\alpha_i$ are being estimated. We check the presence of unit root in variable $Y_t$ by comparing the computed absolute value of the t statistic with that of the ADF critical values. If the computed absolute value of the t statistic exceeds the ADF

critical values, we reject the null hypothesis, and conclude that the series is stationary. But if the computed absolute value of the t statistic is below the ADF critical values, we accept the null hypothesis and conclude that the series is non- stationary.

$H_0$: $\beta_{2(eq\ 2)\ and}\ \beta_{3(eq3)} = 0$; the time series is non-stationary (has a unit root).

$H_1$: $\beta_{2(eq\ 2)\ and}\ \beta_{3(eq3)} < 0$; the time series is stationary.

On the other hand, Phillips and Perron, which is argued to be more robust to serial correlation and time-dependent heteroskedasticity, use non parametric statistical methods to take care of the serial correlation in the error terms by making corrections to the t-statistics of the coefficients of the lagged variables, not by adding the differenced term of the lagged variables. The PP method stick to the original ADF regressions but make nonparametric adjustment to the ADF statistics to take into account potential autocorrelation pattern in the error as given below.

$$\Delta Y_t = \mu + \alpha Y_{t-1} + \varepsilon_t \quad \text{.....(3.5)}$$

Where; $\varepsilon_t$ is I (0) and may be heteroskedastic. The PP tests correct for any serial correlation and heteroscedasticity in the errors $\varepsilon_t$ of the test regression by directly modifying the test statistics. The decision to accept or reject the null hypothesis is the same with that of ADF method given above.

### 3.3.3 Cointegration Test

Though individual time series are not stationary, a linear combination of these variables could be stationary (i.e., they may be cointegrated). If these variables are cointegrated, then they have a stable longrun relationship. The issue of cointegration applies when two series are integrated of the same order, but a linear combination of them results I(0). In this case, the regression of one on the other is not spurious; but instead tells us something about the longrun relationship between them.

There are several methods for cointegration tests. Engle Granger two step procedure, Johansen maximum likelihood procedure and Pesaran and Pesaran bound testing approach are some of them. In this regard, this study applies Johansen maximum likelihood procedure. The Johansen

procedure is a multiple equation method that allows the identification of how many cointegration relationships exist among the variables; and also estimate the longrun relationship between order one integrated series. Johansen's methodology is given by the following vector autoregressive (VAR) of order p form:

$$y_t = \chi + A_t y_{t-1} + ... + A_p y_{t-p} + Bx_t + \varepsilon_t \quad \text{.....(3.6)}$$

Where; $y_t$ is nx1vector of non-stationary 1(1) variable, $x_t$ is nx1 vector of deterministic variables, *x* is vector of constant and $\varepsilon_t$ is nx1 a vector of error term.

This VAR can be rewritten in the first differenced form as follows:

$$\Delta y_t = \chi + \Pi y_{t-1} + \sum_{t=1}^{p-1} \Gamma_t \Delta y_{t-1} + Bx_t + \varepsilon_t \text{.....(3.7)}$$

$$where, \Pi = \sum_{t=1}^{p} A_t - I, and, \Gamma = -\sum_{j=i=1}^{p} A_t$$

$\Gamma$ and $\Pi$ represent shortrun adjustment and longrun relationship among the $y_t$ variables, respectively. In the Johansen method, trace and maximum eigenvalue test statistics are the two test statistics for the number of cointegrating vectors. In the trace test, the null hypothesis is that the number of individual cointegrating vectors are less than or equal to r against a general alternative while in maximum eigenvalue test the null is that the number of cointegrating vectors is r against the alternative of r+1 cointegrating vectors.

### 3.3.4 Vector Error Correction Model (VEM)

Once the cointegration is confirmed to exist between variables, then the next step necessitates the construction of error correction mechanism to model dynamic relationship. The purpose of the error correction model is to indicate the speed of adjustment from the shortrun equilibrium to the long-run equilibrium state. A Vector Error Correction Model (VECM) is a restricted VAR designed for use with non-stationary series that are known to be cointegrated. Once the equilibrium conditions are imposed, the VECM describes how the examined model is adjusting in each time period towards its long-run equilibrium state. Since the variables are supposed to be cointegrated, then in the short-run, deviations from this long-run equilibrium will feedback on the changes in the dependent variables in order to force their movements

towards the long run equilibrium state. Hence, the cointegrated vectors from which the error correction terms are derived are each indicating an independent direction where a stable and meaningful long run equilibrium state exists.

The VECMs associated with longrun estimate is specified below:

$$\Delta Y_t = \psi + \beta_1 \Delta X_t + \beta_2 ECM_{t-1} + \varepsilon_t \quad \text{.....(3.8)}$$

Where, $\Delta$ denotes the first difference operator; $ECM_{t-1}$ is one period lagged error term; and $\varepsilon_t$ is a white noise error term.

The coefficient of error correction term could be significant positive, significant negative or insignificant. The positive significance indicates that $Y_t$ is above its equilibrium value and starts to adjust down towards equilibrium in the next period. Negative significance indicates that $Y_t$ is below its equilibrium value; and it starts to adjust towards equilibrium in the next period. However, the insignificance of error correction term indicates the equilibria of the system (i.e., no time to take for adjustment) and finally, the absolute value of $\beta_2$ decides how quickly the equilibrium is restored (Gujarati, 2004).

### 3.3.5 Granger Causality Test

In multivariate time series analysis, causality test is done to check which variable causes (precede) another variable. Given two variables X and Y; X is said to Granger cause Y if lagged values of X predicts Y well. If lagged values of X predict Y and at the same time lagged values of Y predict X, then there is a bi-directional causality between X and Y. According to Riezman, Summers, and Whiteman (1996), neglecting import while considering the causality between exports and growth leads to biased results. Hence, when testing the ELG theory this study takes imports into consideration when testing for the causality between exports and growth.

Engel and Granger (1969) suggest that if Cointegration exists between two variables, then proper statistical inference is, obtained only by analyzing causality based on error correction model (ECM). The VECM is employed to determine short run and long run causality between export and economic growth. The VECM estimation is performed by the following VAR framework. (equations 3.9 to 3.11)

$$\Delta \ln Y_t = \beta_{11} + \sum_{i=1}^{n} \beta_{12i} \Delta \ln X_{t-i} + \sum_{i=1}^{n} \beta_{13i} \Delta \ln M_{t-i} + + \sum_{i=1}^{n} \beta_{14i} \Delta \ln Y_{t-i} + \beta_{15} EC_{1,t-1} + U_{1t} \quad ---3.9$$

$$\Delta \ln X_t = \beta_{16} + \sum_{i=1}^{n} \beta_{17i} \Delta \ln X_{t-i} + \sum_{i=1}^{n} \beta_{18i} \Delta \ln M_{t-i} + \sum_{i=1}^{n} \beta_{19i} \Delta \ln Y_{t-i} + \beta_{20} EC_{2,t-1} + U_{2.t} \quad ---3.10$$

$$\Delta \ln M_t = \beta_{21} + \sum_{i=1}^{n} \beta_{22i} \Delta \ln X_{t-i} + \sum_{i=1}^{n} \beta_{23i} \Delta \ln M_{t-i} + \sum_{i=1}^{n} \beta_{24i} \Delta \ln Y_{t-i} + \beta_{25} EC_{3,t-1} + U_{3t} \quad ---3.11$$

Where; $Y_t$ is GDP ; $X_t$ is export; $M_t$ is import $EC_{1\text{-}3,t\text{-}1}$ is error correction term obtained from the respective cointegrating regression; $\Delta$ is first difference; n is lag length.$U_{1\text{-}3t}$ are serially uncorrelated random error terms with mean zero.

# CHAPTER FOUR

# RESULTS AND DISCUSSION

## 4.1 RESULTS

### 4.1.1 Unit Root Test

Testing the existence of unit roots in the variables is very essential before any meaningful regression is performed with the time series variables, either through graphical inspection or by conducting formal unit root tests. However it is always advisable to first plot the time series under study to get an initial clue about the likely nature of the time series before perusing a formal unit root test. (Gujarati, 2004). Despite its unreliability, it is difficult to make inferences about the presence of unit root based on graphical evidence only. So, all variables are detected through graphical inspection of their time series plots. The plots of the variables at their level and first difference are presented in appendix B. From the plot, it is easily observed that each variable seems to have a non-constant mean which explicitly stipulates that the series are not stationary in levels. In contrast the plots of the variables in the first difference are at least, visually revolve around their mean expressing that the variables are stationary.

As to the formal tests, the well known Augmented Dickey- Fuller (1981) and the Phillips Perron (1988) are applied to test the existence of unit root and ascertain their order of integration. The primary interest is to determine whether the variables are stationary or not. The null hypothesis for the test states that, the series has unit root. Whereas, the alternative hypothesis says the series is stationary (i.e., no unit root). Both of these unit root tests suggest that, the variables under examination are a unit root process at levels; and hence, integrated of order one, I (1).The unit root test is undertaken both at the intercept and intercept plus trend regression forms, and the results of Augmented Dickey- Fuller (ADF) and PP unit root tests are given in Tables 4.1 and 4.2 below.

**Table 4.1: ADF unit root test**

| | Level | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | Intercept | | | | Trend and intercept | | | | |
| Variables | test Statistic | 1% critical | 5% values | p-value | test statistic | 1% critical | 5% values | p-value | Level |
| LGDP | 1.9438 | -3.5654 | -2.9199 | 0.999 | 0.4014 | -4.148 | -3.500 | 0.998 | I(1) |
| LGCF | -2.0721 | -3.5654 | -2.9199 | 0.255 | -2.3095 | -4.148 | -3.500 | 0.857 | I(1) |
| LLAB | -0.572 | -3.5654 | -2.9199 | 0.867 | -1.795 | -4.148 | -3.500 | 0.691 | I(1) |
| LX | -2.1964 | -3.5654 | -2.9199 | 0.210 | -2.08 | -4.148 | -3.500 | 0.543 | I(1) |
| LM | - 1.9886 | -3.5654 | -2.9199 | 0.2908 | -2.802 | -4.148 | -3.500 | 0.203 | I(1) |
| | **First difference** | | | | | | | | |
| DLGDP | -7.3363 | -3.5683 | -2.9211 | 0.000* | -7.909 | -4.161 | -3.502 | 0.000* | |
| DLGCF | -7.2832 | -3.5683 | -2.9211 | 0.000* | -7.299 | -4.157 | -3.502 | 0.000* | |
| DLLA | -4.7391 | -3.5683 | -2.9211 | 0.000* | -4.6870 | -4.167 | -3.502 | 0.002* | |
| DLX | -7.9727 | -3.5683 | -2.9211 | 0.000* | -7.9502 | -4.157 | -3.502 | 0.000* | |
| DLM | -8.3888 | -3.5683 | -2.9211 | 0.000* | -8.3239 | -4.157 | -3.502 | 0.000* | |

Where * indicates rejection of null hypothesis both at 1% and 5% level of significance.

Source: Own estimation using Eviews 7.0.2

**Table 4.2 PP unit root test**

| Level | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | Intercept | | | | Trend and intercept | | | | |
| Variables | test Statistic | 1% critical values | 5% | p-value | test statistic | 1% critical values | 5% | p-value | Level |
| LGDP | 2.2877 | -3.565 | -2.919 | 0.999 | 0.7324 | -4.148 | -3.500 | 0.999 | I(1) |
| LGCF | -2.1655 | -3.565 | -2.919 | 0.221 | -2.3951 | -4.148 | -3.500 | 0.377 | I(1) |
| LLAB | -0.4708 | -3.565 | -2.919 | 0.888 | -1.6166 | -4.148 | -3.500 | 0.772 | I(1) |
| LX | -2.3148 | -3.565 | -2.919 | 0.171 | -2.2178 | -4.148 | -3.500 | 0.469 | I(1) |
| LM | -1.9886 | -3.565 | -2.919 | 0.290 | -2.7842 | -4.148 | -3.500 | 0.209 | I(1) |
| **First difference** | | | | | | | | | |
| DLGDP | -7.3500 | -3.565 | -2.919 | 0.000* | -7.905 | -4.152 | -3.502 | 0.000* | |
| DLGCF | - 7.4806 | -3.565 | -2.919 | 0.000* | -7.550 | -4.152 | -3.502 | 0.000* | |
| DLLAB | -4.7621 | -3.565 | -2.919 | 0.000* | -4.802 | -4.152 | -3.502 | 0.001* | |
| DLX | -7.9250 | -3.565 | -2.919 | 0.000* | -7.900 | -4.152 | -3.502 | 0.000* | |
| DLM | -8.4234 | -3.565 | -2.919 | 0.000* | -8.352 | -4.152 | -3.502 | 0.000* | |

Where * indicates rejection of null hypothesis both at 1% and 5% level of significance.

Source: Own estimation using Eviews 7.0.2

The Tables 4.1 and 4.2 above presents the result of both ADF (based on the automatic lag length selection by Schwartz information criteria) and PP test respectively. The results obtained show that all the time series in levels are non-stationary and Integrated at an order of 1, i.e. I(1), which means they do not have constant mean and variance over time but become stationary when differenced once. Thus, the null hypothesis cannot be rejected for any of the variables under examination at 1% and 5% level of significance. However, when differenced once, the tests reject the presence of unit root.

Although the individual series could be non-stationary, a linear combination of them might be stationary (Engle and Granger, 1987); which means a well-defined linear relationship exists among them in the long run. So, the subsequent discussion provides a test for cointegration between the variables under investigation in which the null hypothesis claims no cointegration.

### 4.1.2 Lag Length Selection

Optimal lag length determination in vector autoregressive (VAR) model precedes the task of testing cointegration relationship. Hannan-Quinn information criteria (HIC), the Log Likelihood (LL), the Schwarz information criteria (SIC) and the Akaike information criteria (AIC) models are considered for selecting the optimal lag. Empirical literature often suggests the use of the Hannan-Quinn criterion (HQC), Akaike Information Criterion (AIC) and the Schwarz Bayesian Criterion (SBC) to select the lag length of the VAR system especially for small sample size i.e up to 60 or less (Asghar and Abid 2005).

This study determined the optimal lag length according to the VAR lag order selection criteria; and hence, all information criterion models select the same lag length which is one. So in this study, the lag length used for cointegration test is one. The result is given in Table 4.3 below.

**Table 4.3 Lag Length Selection**

| Lag | LogL | LR | FPE | AIC | SC | HQ |
|---|---|---|---|---|---|---|
| 0 | 42.1434 | NA | 1.4207 | -1.580571 | -1.383747 | -1.506505 |
| 1 | 334.228 | 509.594 | 1.6512* | -12.9487* | -11.763* | 2.50148* |
| 2 | 352.209 | 27.5449 | 2.312 | -12.64718 | -10.48211 | -11.83245 |
| 3 | 384.204 | 42.20678 | 1.8912 | -12.94486 | -9.795672 | -11.7598 |
| 4 | 405.367 | 23.4144 | 2.7212 | -12.78158 | -8.648274 | -11.22619 |
| 5 | 430.831 | 22.755 | 3.812 | -12.80132 | -7.683894 | -10.8756 |

* indicates lag order selected by the criterion

Source: Own estimation using Eviews 7.0.2

LR: sequential modified LR test statistic (each test at 5% level)
FPE: Final prediction error
AIC: Akaike information criterion
SC: Schwarz information criterion
HQ: Hannan-Quinn information criterion

### 4.1.3 Export and Economic Growth in the Long Run

Testing the cointegrating relationship among the variables (i.e., GDP, GCF, LAB, X and M) requires the integration of variables to be in the same order. According to ADF and PP test results all variables are found to be integrated of order one, i.e., I (1); and thus, have a stochastic trend. This means that, they are all candidates for inclusion in a long-run relationship for testing the number of cointegrating relationship among them. In the case of cointegrating equation estimation, this study selected under linear trend and level data. Both tests the maximum eigenvalue ($\lambda_{max}$) and trace statistics ($\lambda_{trace}$) are used to determine the number of cointegrating vectors.

Table 4.4 below presents the results obtained by the application of the Johansen procedure to test for cointegration relationship using a VAR at an order of one.

**Table 4.4: Result of Johansen cointegration test**

| Hypothesized No. of CE(s) | Eigenvalue | Trace Statistic | 0.05 Critical Value | Prob.* | Max-Eigen Statistic | 0.05 Critical Value | Prob.* |
|---|---|---|---|---|---|---|---|
| None * | 0.655880 | 130.008 | 95.75366 | 0.0000* | 53.33831 | 40.07757 | 0.0009* |
| At most 1* | 0.500683 | 76.6706 | 69.81889 | 0.0128* | 34.72566 | 33.87687 | 0.0395* |
| At most 2 | 0.361909 | 41.9449 | 47.85613 | 0.1603 | 22.46372 | 27.58434 | 0.1975 |
| At most 3 | 0.261467 | 19.4812 | 29.79707 | 0.4587 | 15.15448 | 21.13162 | 0.2782 |
| At most 4 | 0.065835 | 4.32673 | 15.49471 | 0.8755 | 3.405092 | 14.26460 | 0.9162 |
| At most 5 | 0.018264 | 0.92164 | 3.841466 | 0.3370 | 0.921647 | 3.841466 | 0.337 |

Where (*) means rejection of the null hypothesis of no cointegration at the 5% level of significance.

Source: own calculation using Eviews 7.2.0

In Table 4.4 above the trace test indicates the existence of two cointegrating equations at 5 percent significance. And the maximum eigen value test makes the confirmation of this result.

Thus the four variables of the study (i.e., GDP, GCF, X, M) have long run equilibrium relation between them. But in the short run there may be deviations from the equilibrium.

Once the existence of cointegrating vector is identified, Johansen Maximum Likelihood method of the linear combination of variables represented by the first row of standardized beta (β) eigenvectors represents the long run equation. Table 4.5 below presents the results of beta matrices.

**Table 4.5 Normalized beta (β) eigenvectors.**

Normalized cointegrating coefficients (standard error in parentheses)

| GDP | GCFSA | LAB | XSA | MSA | DUM |
|---|---|---|---|---|---|
| 1.000000 | -0.739175 | -0.990172 | -0.566955 | 0.544052 | 0.696607 |
| | (0.14662) | (0.11015) | (0.14385) | (0.17064) | (0.09089) |

Source: own calculation using Eviews 7.2.0

In the above long run model, all coefficients have the anticipated signs indicating that labor, capital and exports positively affect output while import is negatively related with output. This shows that the much dependence on import for different activities of the country has negatively affected the growth of the economy. Moreover the negative coefficient of the dummy variable suggests that war, drought and famine and the change of government with a new ideology has negatively affected the growth of the economy.

Next, test of significance on the long run parameters which is obtained by imposing zero restriction on the long run β coefficients is conducted. Table 4.6 presents the test of significance of long run coefficients.

**Table 4.6: Test of Significance of long- run coefficient**

| Variable | β coefficient | LR test of restriction ch^2(1) | Prob |
|---|---|---|---|
| LGCF | -0.739175 | 8.684538 | 0.0032* |
| LLAB | -0.990172 | 8.3250538 | 0.0039* |
| LXSA | -0.566955 | 4.102921 | 0.0428** |
| LMSA | 0.544052 | 2.935554 | 0.086649*** |
| DUM | 0.696607 | 15.06989 | 0.0001* |

Where; *, ** and*** denotes rejection of the null hypothesis at 1%, 5% and 10% significance level respectively.

Source: own calculation using Eviews 7.2.0

As revealed in the above Table (4.6) the null hypothesis that claims β coefficients are not significantly different from zero is rejected at 5% level of significance for gross capital formation, labor and export, indicating that the variable have significant effect on economic growth of Ethiopia in the long run.

Therefore, the long run equation is given as follows:

Y = 0.739175GCF +0.990172LLAB + 0.566955XSA -0.544052MSA-0.696607DUM

$P_{value}$ [0.0032]* [0.0039] * [0.042] ** [0.0866] *** [0.0001]*

In order for the results to be econometrically creditable and economically meaningful, it is important to investigate the statistical properties of the model. To this end, a number of diagnostic tests have been undertaken. The result shows that, the null of no serial correlation, homoscedasticity and normality are not rejected at conventional level of significance. Moreover, the RESET test also confirmed that, there is no functional misspecification problem.

From the above result, we can infer that in the long run an increase of export by 1% will lead to increase of economic growth by 0.56%. This could be due to the multiplier effect of export

to economic growth. More exports mean more aggregate output from firms and industrial facilities, as well as a greater number of people employed to keep these firms running. Moreover the receipt of export proceeds also represents an inflow of funds into the country, that stimulates consumer spending which in turn play a crucial role in increasing the investment level as a result Ethiopia's overall output level, eventually economic growth. The finding is consistent with that of Jarra's findings (2013) in case of Ethiopia.

### 4.1.4 Vector Error Correction Model

After the existence of cointgeration among variables is confirmed, the next step demands the construction of error correction mechanism to indicate the speed of adjustment from the short run equilibrium to the long-run equilibrium state.

This is formulated as follows:

$$\Delta Y_t = \psi + \sum_{t=1}^{m} h_i \Delta Y_{t-i} + \sum_{j=1}^{m} \lambda_j \Delta GCF_{t-j} + \sum_{q=1}^{m} \phi \Delta LAB_{t-q} + \sum_{z=1}^{m} \gamma \Delta X_{t-z} + \sum_{j=1}^{m} \mu_j \Delta M_{t-j} + \pi ECM_{t-1} + \varepsilon_t \quad ----4.1$$

Where; $\pi$ is the speed of adjustment

In order to estimate the dynamic short run model, the first difference of all variables are estimated using OLS by including one period lag of the vector error term saved from the long run equation.

With the exception of import and one period lagged gross domestic product all included variables are found to be statistically insignificant. This means gross capital formation, labor and export does not affect economic growth of Ethiopia in the short run. Moreover, normality test, residual autocorrelation, test of heteroscedasticity and Ramsey's RESET tests are conducted; and all tests did not detect any problem of serial correlation, hetroscedasticity, non-normality and model misspecification

**Table 4.7: Result of VECM estimate**

| Variables | Coefficient | Std.error | t-value | Prob |
|---|---|---|---|---|
| C | 0.002203 | 0.009897 | 0.222534 | 0.825 |
| DGDP_1 | 0.636637 | 0.116713 | -5.454709 | 0.0000* |
| DLGCF_1 | -0.053858 | 0.067538 | -0.797454 | 0.4298 |
| DLLAB_1 | -0.869619 | 0.954181 | -0.911378 | 0.3674 |
| DLX_1 | 0.078091 | 0.072841 | 1.072088 | 0.2900 |
| DLM_1 | -0.26559 | 0.073676 | -3.604846 | 0.0008* |
| ECT_1 | -0.129729 | 0.040708 | 3.186784 | 0.0028* |
| DUM | -0.072421 | 0.025175 | -2.876727 | 0.0064* |

| | | | |
|---|---|---|---|
| R-squared | 0.606478 | Mean dependent var | 0.001461 |
| Adjusted R-squared | 0.539292 | S.D. dependent var | 0.102035 |
| S.E. of regression | 0.069257 | Akaike info criterion | -2.353716 |
| Sum squared resid | 0.196655 | Schwarz criterion | -2.044848 |
| Log likelihood | 65.66605 | Hannan-Quinn criter. | -2.236532 |
| F-statistic | 9.026777 | Durbin-Watson stat | 2.170864 |
| Prob(F-statistic) | 0.000001 | | |

Source: own calculation using Eviews 7.2.0

In the short run, change in economic growth is positively and significantly affected by last year growth and negatively and significantly affected by import. The base year growth matters for the current year economic improvement and become the base for the enhancement of its components for the years to come. The lagged error correction term (ECT-1) included in the model is negative and significant indicating speed of adjustment towards equilibrium and indicates the existence of a long-run causality between the variables of the study. However the effect of export is insignificant in the short run. This is consistent with the finding of Chemeda (2001) and contradicts from the findings of Gemechu (2002) and Jarra (2013) in case of Ethiopia.

Generally, the magnitude of export, import and gross capital formation in the long run are much higher and significant than the short-run impacts indicating that the impacts of change in those variables on economic growth are much stronger in the long-run than in the short run.

### 4.1.5 Granger Causality Test

Cointegration implies the existence of at least unidirectional causality between variables but it fails to provide the direction of causality (Engel and Granger, 1987). Thus, having established a cointegration relationship, we test for Granger causality among export, import and economic growth based on Error Correction Model (ECM). According to Granger (1988), if the series are found to be cointegrated, the inclusion of error correction term in testing causal relationship among variables is very much important, since, it provides an extra channel through which causality may be observed. Otherwise the standard Granger test may lead to invalid causal information. Moreover, including error correction term also allows us to distinguish between the short run and long run causality. Four patterns of causality can be distinguished: (a) unidirectional causality from one variable let us say X to another variable Y; (b) unidirectional causality from Y to X; (3) feedback or bi-directional causality; and (d) no causality.

The coefficients of each explanatory lagged change variable (i.e., ΔlnGDP-1, ΔlnX-1 and ΔlnM-1) in each VECM equation tells us about the short-run Granger causality, where as the lagged error correction term (ECM-1) shows the long-run causality among the variables. As long as the coefficient of error correction term is statistically significant, causality exists among the variables under investigation even if the coefficients of the lagged variables are not statistically significant.

The direction of causality can be determined by testing for the significance of the coefficients of each dependent variable in equations (3.9) to (3.11). In order to check for short-run causality that enables us to detect whether causality runs from export and import to economic growth in equation (3.9), we test the null hypothesis [$H_0$: $\beta_{12i}=0$; and $H_0$: $\beta_{13i}=0$] against the alternative hypothesis. The underlying null hypotheses for testing whether short run causality runs from economic growth and import to export in equation (3.10) are [$H_0$: $\beta_{19i}=0$; and $H_0$: $\beta_{18i}=0$]. Furthermore, for short run causality running from economic growth and export to import in equation (3.11), we test [$H_0$: $\beta_{24i}=0$; $H_0$: and$\beta_{23i}=0$]

For long-run causality we need to test the significance of the error correction term, which means testing weather the coefficient of the respective error correction term represented by $\beta_{15,}$

$\beta_{20}$ and $\beta_{25}$ are equal to zero or different from zero. As a testing criterion, the F statistic are used. With these statistics the variables of interests (economic growth, export and import) are tested for each separate equation. The results are indicated in the following table.

**Table 4.8: Granger Causality Test Results: A VECM Approach**

The included variables in the analysis are: GDP, share of export earnings in the GDP (X), and share of import in the GDP (M).

| Dependent variables | DlnGDP | DlnX | DlnM | ECM_1 |
|---|---|---|---|---|
| DlnGDP | - | 0.3562 | 0.7316 | 0.0298* |
| DlnX | 0.1484 | - | 0.6307 | 0.0124* |
| DlnM | 0.5741 | 0.2397 | - | 0.0013* |

In the longrun all variables have a cumulative effect for each other's causality that means in the longrun export and import Granger cause growth, economic growth and export Granger cause import at the same time growth and import Granger cause export which confirms longrun bidirectional causality that runs among the variables (GDP, Export and Import). However in the shortrun there is no causality among variables. The result shows the importance of export in influencing economic growth, at the same time the role of growth in enhancing export of Ethiopia. With respect to the previous work undertaken concerning export and growth relations, the findings that shows export Granger cause economic growth in the long run is consistent with the findings of Silaghi (2009) in case of Czech Republic and Lithuania. Shirazi and Abdul Manap (2005) in case of Pakistan and the findings of Jarra (2013) and Chemeda (2001) in case of Ethiopia.

## 4.2 DISCUSSION

All variables (i.e., GDP,GCF,LAB,X and M) are found to be non stationary at levels and become stationary when they are differenced once ,this is consistent with the theoretical argument that most macroeconomic series are not stationary at their levels and become stationary at their first difference. Checking whether a time serious is stationary or non stationary is important because if a time series is non stationary, we can study its behavior only for the time period under consideration. Each set of time series data will therefore be

for a particular period. As a consequence, it is not possible to generalize it to other time periods. Therefore, for the purpose of forecasting, such non stationary time series may be of little practical value (Gujarati, 2004).

Though individual time series are not stationary, a linear combination of these variables could be stationary (i.e., they may be cointegrated). Economically speaking, two variables will be cointegrated if they have a long-term, or equilibrium, relationship between them. In this study GDP, GCF, labor, export and import are found to be cointegrated which confirms the existence of longrun relation among the variables. In the longrun an increase of export by 1% leads to a 0.56% overall economic growth achievement this could be due to the multiplier effect of export i.e. as the export performance increases the amount of foreign currency the country would get increases so as to increase its capacity to invest and/or import more on capital goods which in turn play a crucial role in increasing Ethiopia's overall output level, and increased export performance also means more aggregate output from firms and industrial facilities, as well as a greater number of people employed to produce those outputs that stimulates consumer spending which in turn play an important role in increasing the investment level as a result Ethiopia's overall output level, eventually economic growth. With regard to previous studies specifically done in Ethiopia this study is consistent with the findings of Jarra, 2013.

While in the short run export has an insignificant impact on economic growth in Ethiopia this could be due to that export is a longrun phenomenon that does not show its effect on economic growth immediately. This is consistent with the finding of Chemeda (2001) and contradicts from the findings of Gemechu (2002) and Jarra (2013) in case of Ethiopia. Generally, the magnitude of export, import and gross capital formation in the long run are much higher and significant than the short-run impacts indicating that the impacts of change in those variables on economic growth are much stronger in the long-run than in the short run. The direction of causality between macroeconomic variables determine the type of policy that should be formulated by policy makers to this regard if export causes growth export promotion oriented policies are more appropriate but if growth causes export then import substitution oriented policies would be advisable(Oskooee,2005). The result of this study reveals the existence of longrun bidirectional causality between export and growth but no short run causality among the variables this indicates that Ethiopia will accelerate its

growth if the country focus on implementing both export promotion oriented and import substitution oriented policies. The findings that shows export Granger cause economic growth in the long run is consistent with the findings of Jarra (2013) in case of Ethiopia.

# CHAPTER FIVE

# CONCLUSION AND POLICY IMPLICATIONS

## 5.1 Conclusion

The study examined the contribution of export in economic growth of Ethiopia from 1960/61 to 2011/12 by including another macroeconomic variable that is import in the conventional production function form using annual time series data. In empirical analysis, Augmented Dickey Fuller (ADF) and Phillips Perron (PP) unit root test are used in testing the stationarity of the variables. The study result shows that all variables (i.e., Gross Domestic Product, Gross Capital Formation, Labor, Export and Import) are found to be integrated of order one I(1). Therefore, the study proceeds to determine the existence or otherwise of cointegrating vectors in the variables. The result of Johansen cointegration test shows that Gross Domestic Product, Gross Capital Formation, Labor, Export and Import are cointegrated (i.e., they have longrun equilibrium relationship).

- In the long run gross capital formation, labor and export positively and significantly affect economic growth of Ethiopia. While import is negatively related with output, this could be due to consumer durables and non-durables outweigh the imports of capital goods. This in turn slows down economic growth through affecting the country's international reserves. The result of Granger causality test shows a long run bidirectional causality that goes from the cumulative effect of export and import to economic growth; from growth and import to export; and from economic growth and export to import. The existence of bidirectional causality between export and growth necessitate the formulation of both export oriented and import substitution policies.

  Generally, export is important for facilitating economic growth; and economic growth also has an impact on stimulating export growth. In other words, economic growth Granger causes export and export is also the causes for economic growth in Ethiopia in the long run.

## 5.2 Policy Implications

Ethiopia adopted Export-Led Growth strategy since 1991/92, despite the focus on export diversification in the development plans of the country, the export pattern is still dominated by

traditional produces whose world price has been fluctuating. The findings of the study suggest that the country needs to strengthen emergence and expansion of domestic industries, and at the same time, strengthen export capacity to promote diversification both in the export and domestic industrialization sector to fully exploit the benefits of those sectors and achieve a sustainable growth. So, designing export promotion strategies, policies and support services conducive towards stimulating competitiveness, and designing import substitution promotion strategies, policies and support services conducive towards promoting the emergence and expansion of domestic industries would be more advantageous for achieving an accelerated economic growth.

Generally, selective protection of export expansion would be more efficient than complete trade liberalization.

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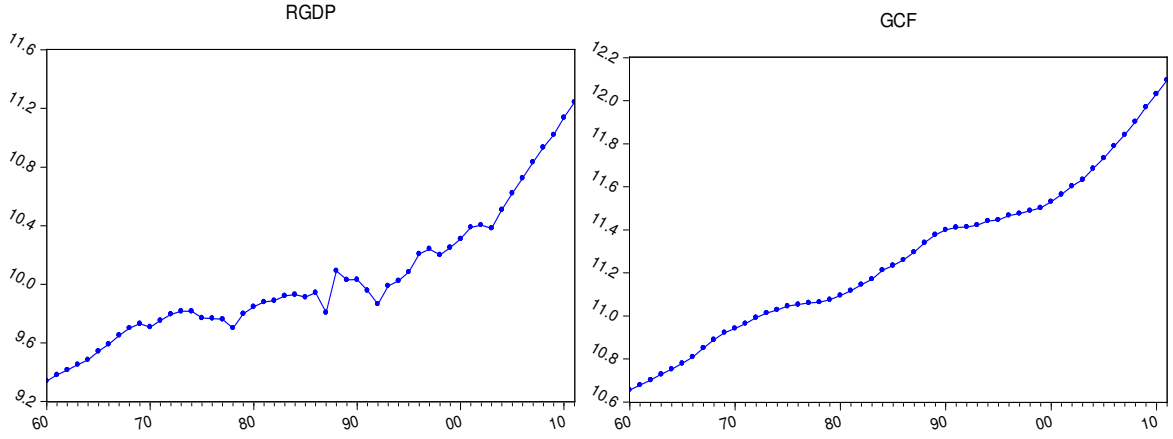
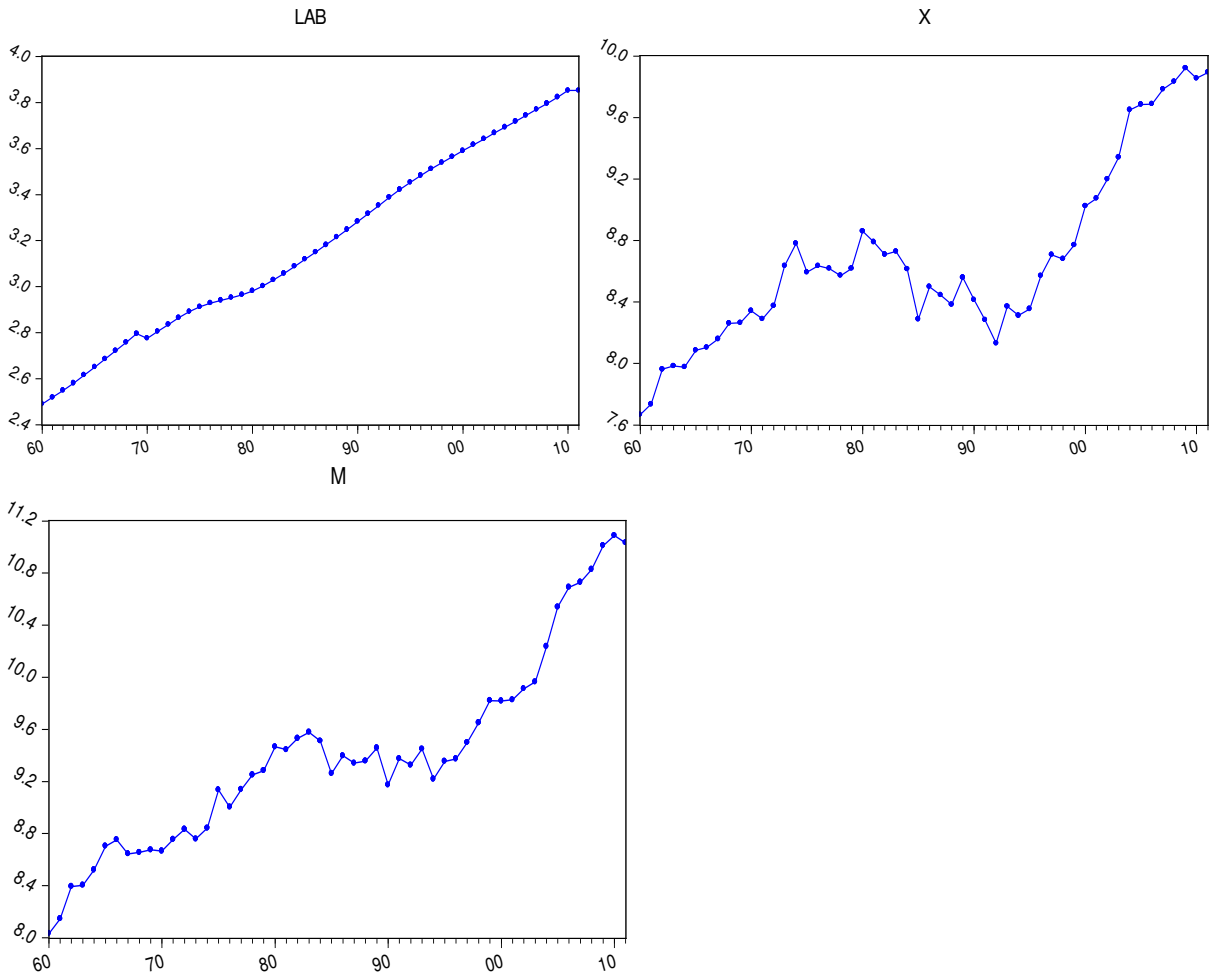
# APPENDICIES

## Appendix A: Descriptive Statistics (Test of normality)

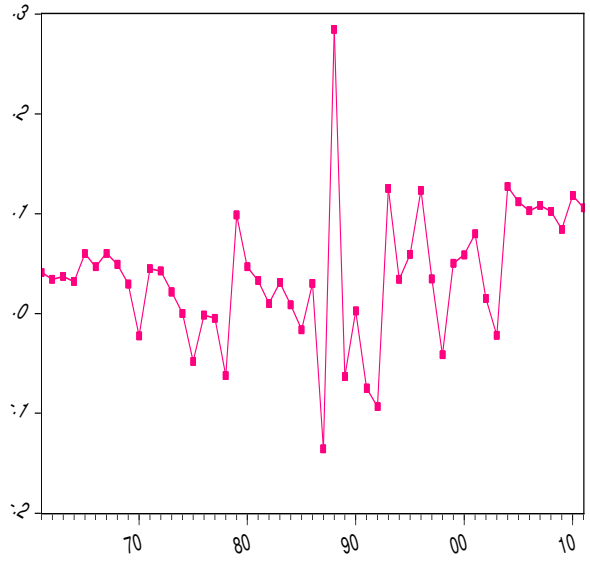
| | RGDP | GCF_SA | LAB | X_SA | M_SA |
|---|---|---|---|---|---|
| Mean | 10.02988 | 3.950445 | 3.180586 | 3.249776 | 3.97591 |
| Median | 9.916209 | 3.946317 | 3.134496 | 3.212815 | 4.0283 |
| Maximum | 11.24303 | 4.421211 | 3.851971 | 3.745707 | 4.596742 |
| Minimum | 9.339005 | 3.569512 | 2.489847 | 2.872982 | 3.29815 |
| Std. Dev. | 0.451862 | 0.199481 | 0.408731 | 0.235154 | 0.328878 |
| Skewness | 0.960446 | 0.437915 | 0.084035 | 0.150032 | 0.052976 |
| Kurtosis | 3.41523 | 2.991012 | 1.77686 | 1.955747 | 2.249001 |
| | | | | | |
| Jarque-Bera | 8.368189 | 1.662174 | 3.302693 | 2.557753 | 1.246323 |
| Probability | 0.015236 | 0.435576 | 0.191791 | 0.27835 | 0.536246 |
| | | | | | |
| Sum | 521.5539 | 205.4232 | 165.3905 | 168.9883 | 206.7473 |
| Sum Sq. Dev. | 10.41315 | 2.029436 | 8.520116 | 2.820168 | 5.516203 |
| | | | | | |
| Observations | 52 | 52 | 52 | 52 | 52 |

## APPENDIX B: Plots of variables at levels and first difference

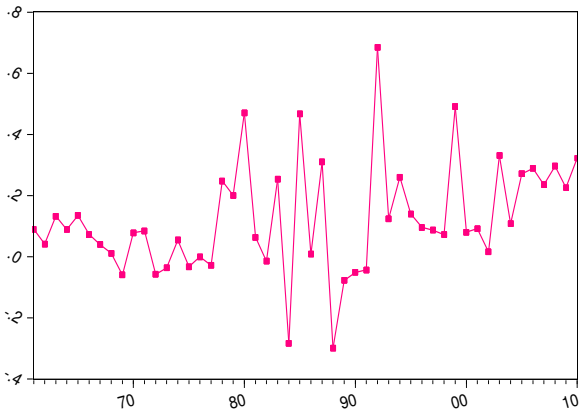



LAB
X
M
4.0
3.8
3.6
3.4
3.2
3.0
2.8
2.6
2.4
10.0
9.6
9.2
8.8
8.4
8.0
7.6
11.2
10.8
10.4
10.0
9.6
9.2
8.8
8.4
8.0
60
70
80
90
00
10

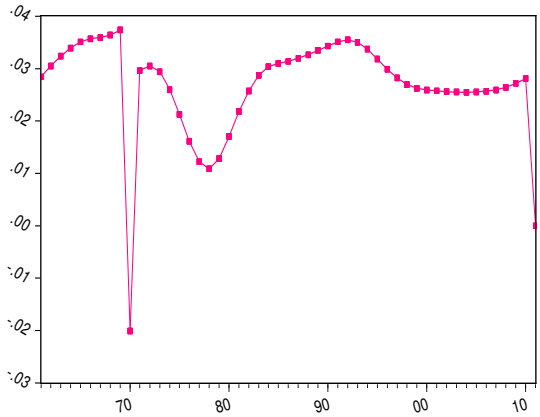
RGDP NA



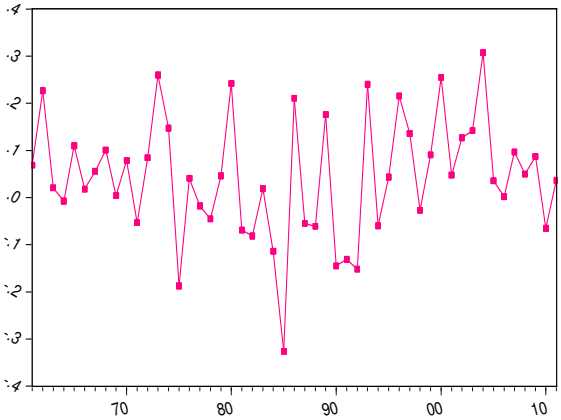

GCF NA




LAB NA




X NA




M NA